

Interdisciplinary Instrumentation Colloquium

Molecular Electron Microscopy – Applications and Challenges

Speaker: Ken Downing
Life Sciences Division, LBNL

Date: Wednesday, Sept. 21, 2005

Time: 4:00 PM sharp (refreshments at 3:45)

Place: LBNL, Building 50 Auditorium
(directions at <http://InstrumentationColloquium.LBL.gov>)

Electron microscopy is an increasingly useful tool in studying both subcellular structures at the molecular level and structures of the molecules themselves. Different approaches are used with different specimen types and resolution targets. Electron tomography provides the best images so far of intact cells captured in an essentially native state. Averaging large numbers of individual molecule images leads to a clear view of the molecule's shape and secondary structure, especially important in understanding how protein complexes are put together and how they function. We use electron crystallography to solve protein structures at atomic resolution and understand how the proteins interact with small ligands. The resolution of present-day electron microscopes is good enough to resolve single atoms, but only at exposures far greater than organic materials can withstand. Thus the challenges in pushing each of our techniques toward higher resolution involve using each electron as efficiently as possible to extract the most information from the specimen and then dealing with the necessarily low signal-to-noise ratio in the images. Advances in microscope instrumentation and especially detectors, along with advances in image processing software, continue to expand our capabilities.

Presentations (pdf files) and dates of future colloquia are posted at
<http://InstrumentationColloquium.LBL.gov>

Suggestions for speakers and topics are welcome. Please contact
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